

# Stents for Intracranial Aneurysms: Indications, Limits and Non Indications

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There are quite a few treatment options for embolization of broad based aneurysms.

Besides a huge assortment of specifically 3D configured coils to treat those still challenging aneurysms Prof. Moret introduced a reconstruction technique using temporary inflation of a non-detachable balloon in front of the aneurysm neck during each coil placement. Although this method probably enables treatment of a wide range of wide necked aneurysms, some disadvantages have to be taken into account.

The risk of coil migration after deflation of the balloon could still be a problem and more often, expansion of the coil package after balloon deflation is observed and might narrow the parent artery. This is clearly important if the parent artery has a small diameter. In such cases slight overinflation of the balloon is not always adequate and damage to the vessel wall is conceivable. Using this method the risk of intraprocedural aneurysm rupture especially in small aneurysms might be a real problem because intraaneurysmal pressure can rise dramatically. Damage of the already dysplastic, aneurysm bearing arterial segment due to balloon inflation is also reported. This can lead to sacrifice of the vessel necessitating permanent occlusion. Although it is postulated that with balloon protection volume density of inserted coils can be increased the remaining question is still: is there any reduction of recanalisation in really broad based aneurysms treated with

the remodelling technique? So far, no data are available to prove this hypothesis. With the introduction of self-expanding stent-systems (e.g. Neuroform/Boston Sc.; Enterprise/Cordis) dedicated for intracranial use a larger range of wide necked aneurysm can be treated now. A real positive feature is the extreme flexibility of these stents allowing navigation through very tortuous vessels in contrast to formerly used balloon mounted stents. Fortunately, stent placement at a bifurcation site or even covering small perforating arteries does not cause vessel occlusion. Although it is true that long term effects of that stent in intracranial vessels are unknown, midterm results do reveal no late vessel occlusion neither relevant stenosis. Intimal hyperplasia is only rarely observed probably due to little radial forces of these stents.

One major advantage of stent treatment in wide necked aneurysms seems to be a lower recanalisation rate. Obviously, we do not exactly know the reason for that but alteration of the inflow and or epithelialisation of the stent might be an explanation. First results using stents of the newest generation are even more promising in preventing aneurysm recanalisation. Those braided stents (Pipeline/Chestnut Med. Tec.; Silk/Balt) are designed to use in the intracranial vasculature and got CE-mark recently. Since the mesh of these stents is very dense covering of side branches and perforators has still to be prove to be safe.

A disadvantage of stent treatment is clearly

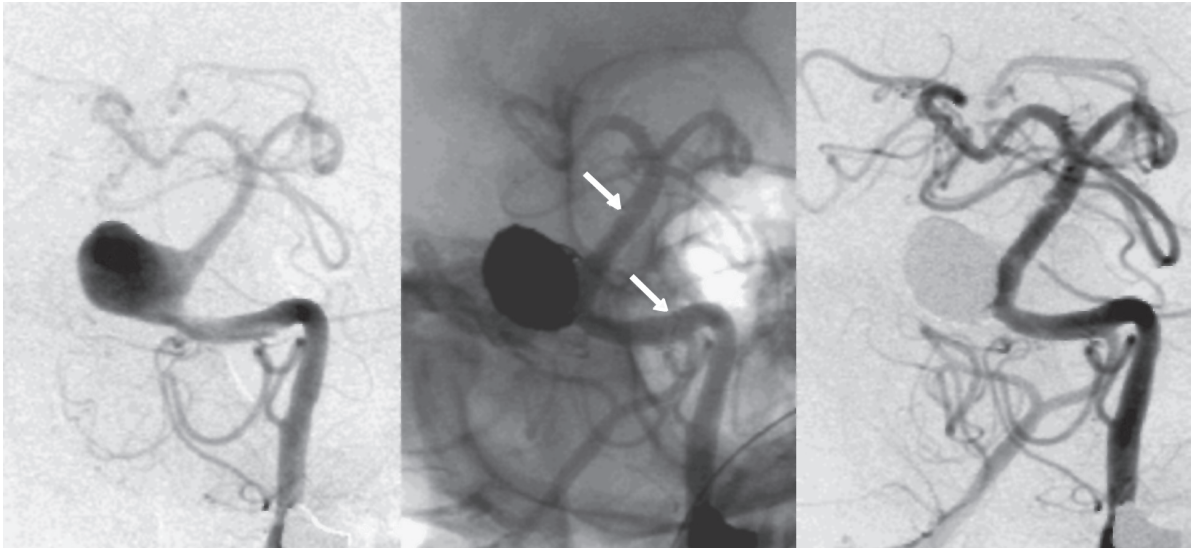


Figure 1 Broad based aneurysm treated with microstent (Neuroform, Boston Sc.) and coils. Balloon remodelling would not have guaranteed parent vessel patency.

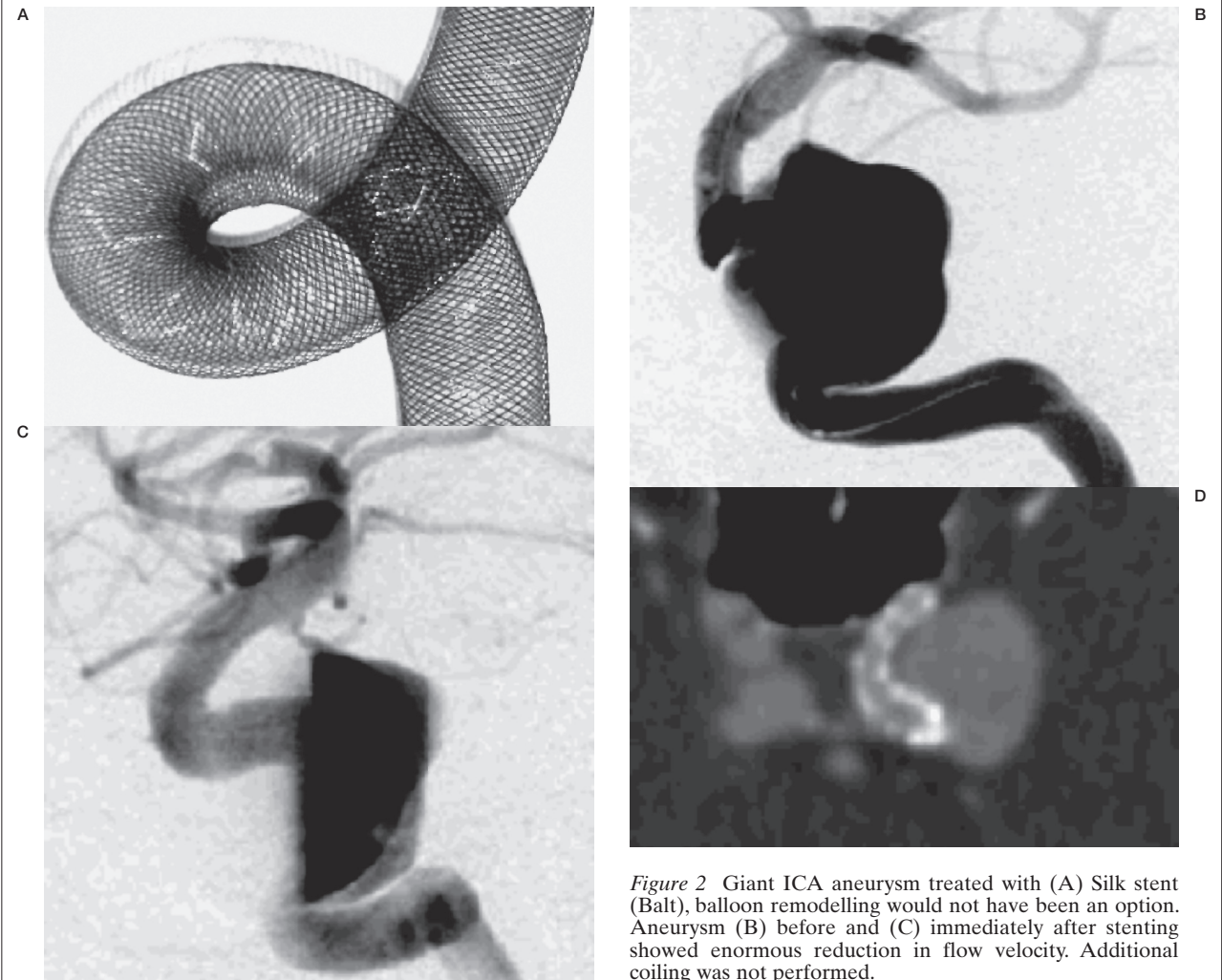


Figure 2 Giant ICA aneurysm treated with (A) Silk stent (Balt), balloon remodelling would not have been an option. Aneurysm (B) before and (C) immediately after stenting showed enormous reduction in flow velocity. Additional coiling was not performed.

the necessity of antiplatelet therapy. Like in any other case of acute rupture ventricular drainage - if necessary or eventually necessary - should be positioned before endovascular treatment. In such order, parenchymal bleeding is unlikely to occur and stent treatment of acutely ruptured broad based aneurysms in the posterior circulation and infraophthalmic region can at least be considered.

Nevertheless, we underline that stents should be reserved for patients without other reasonable options since we do not have adequate basic science or controlled clinical evidence to support the routine use of stents in intracranial

vessels. However, they are clearly an excellent treatment option in otherwise surgical candidates and – from our experience – can even be used in patients with acute SAH.

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